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ABSTRACT

The purpose of this study was to investigate whether homework affects second grade mathematics achievement. The study involved two classes of on-grade-level students and involved a unit on place value. The results indicated that the achievement of the experimental group, which was given homework, was better than the achievement of the control group, which was given no homework. It is suggested that further study on a larger scale is merited. (PK)

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EFFECTS OF MATHEMATICS HOMEWORK ON SECOND GRADE ACHIEVEMENT

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Elaine Finstad

A research
study submitted
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CHAPTER ONE

Introduction

General Introduction

From Colonial days to the twentieth century the school was seen as a place where essential information was passed on to American youth. With the change from a rural to an urban society, the information explosion has challenged the traditional curriculum. The Texas legislature has identified essential elements for students to master in order to demonstrate achievement.[1]

Statement of the Problem

Scholastic Aptitude Test results have shown a decline in math achievement. James Braswell believes that the elementary years may be the source of this decline in that most students may not invest the time and energy necessary to learn mathematics.[2]

Purpose

The purpose of this study is to investigate whether homework affects second grade math achievement.

Importance of the Study

If this study finds that math homework increases second grade math achievement, perhaps meaningful math homework might be incorporated into the math program.

Assumptions

It is assumed that the children in this study are representative of past and future populations at San Jacinto Elementary School.

Limitations and Delimitations

Limitations

This study is limited to elementary school students in the Conroe Independent School District.

Delimitations

This study is delimited to the students who are enrolled during 1987-1988 in the second grade at San Jacinto Elementary School.

Null Hypothesis

Homework has no effect on second grade math achievement.

Procedures

The total population ot this study consists of eighty second graders at San Jacinto Elementary. From the total population two groups were used: one class of twenty-three L (on grade level) students, and one class of sixteen L (on grade level) students.

The unit taught was Unit II, Place Value to 100, in Mathematics Today, Harcourt Brace Jovanovich, Publishers. Chapter 2 Pretest was administered prior to teaching the unit, and Chapter 2 Posttest was administered following the unit.

The data to be analyzed consists of thirty nine observations and six variables. Since statistical tests were run on a computer, a numerical coding system was developed for the six variables. The coding system is as follows:

(1)SEX: a numeral 1 is assigned to males and a numeral 2 is assigned to females;

(2)RACE: a numeral 1 is assigned to white and a numeral 2 is assigned to Hispanic;

(3)LATCH KEY: a numeral 1 is assigned to latch-key students, and a numeral 2 is assigned to those who are not latch-key;

(4)PRETEST: raw score based on a total of 25;

(5)POSTTEST: raw score based on a total of 25;

(6)GROUP: a numeral 1 is assigned to the control group that was given no homework and a numeral 2 is assigned to the experimental group that was given homework.

The data was entered into a computer on Node BALDER, the Sam Houston State University Network at Huntsville, Texas.

ESTAT and t-tests were computed for the variables.

CHAPTER TWO

A Review of Related Literature and Research

Although many people view homework as an essential part of education, it has been the object of strong controversy over the years. Proponents claim that homework extends learning time, fosters initiative and responsibility, and brings home and school closer together. Critics, on the other hand, claim that homework infringes on leisure time and community activities, is busy work, causes family feuds, and discriminates against those who have inappropriate conditions for home study.[3]

The attitude toward homework vacillates in fifteen-to-twenty-year cycles as it is influenced by changing views of childhood and education. As far back as 1913 the Ladies' Home Journal attacked homework as a useless practice with potential danger to children's health.[4] Homework generally decreases during periods of opposition. Pressures such as declining test scores and grades, however, generally precede a swing back toward more homework. This seems to be the case at present.

There has been little research on math homework as it affects achievement in the elementary grades, with many writers stating that homework is of questionable or no value at this level. According to Ronald T. La Conte in his 1981 National Education Association report to teachers on

homework, "there is little justification for any homework" in the primary grades.[5] Surveys, however, reveal that parents and teachers favor homework and students feel it's necessary.[6]

The studies that have been conducted show conflicting results: some show that math homework does improve test scores and grades; some show no difference. Some studies have methodological flaws, conclusions that do not reflect the data, lack of data, or lack of direct observations.

Goldstein Studies 1960

Goldstein (1960) reviewed homework research listed in the Education Index from 1900 to 1960. Of 280 titles, there were seventeen experimental studies. Of these, there were none in Grades 1 through 4, seven in Grades 5 and 6, and fourteen in junior and senior high school.[7] Several are briefly summarized.

Di Napoli (1937) used matching pairs of fifth and seventh grade math students in five New York City public schools to compare compulsory and voluntary homework as measured by a battery of Metropolitan Achievement Tests. Test scores in fifth grade favored compulsory homework in eight of the nine subjects; in fact, the total average gain was statistically significant at the .05 level. Gains in seventh grade were variable with over-all gain slightly favoring the voluntary group, but not statistically significant. Di Napoli's final recommendations to abolish compulsory homework in favor of voluntary homework are contrary to the findings, according to Goldstein.[8]

Crawford and Carmichael's (1937) El Segundo Study of long-term effects of homework in grades five through eight in a California grammar school slightly favors the years in which there was compulsory homework. Follow-up studies significantly favored the homework group. As the abolished homework group entered high school, there was a significant drop in high school marks compared with prior years in classmates who had compulsory homework in elementary school. Goldstein disagrees with Carmichael's final conclusion -- that pupils do not learn much from home study.[9]

Homework was abolished for twenty weeks by Vincent (1937) in selected subjects in Grades 5 and 6 in Troy, New York. The findings show superiority in arithmetic groups but not English or geography. Teahan (1935), however, found no difference in mathematics achievement between homework classes in sixth, seventh, and eighth-graders in New Jersey, though his report is sketchy and unclear.[10]

Cooke and Brown (1935) had a thousand Alabama pupils in Grades 5 through 8 keep records of time spent on homework. Data was omitted from the study with a conclusion that there is nothing to be gained for homework in elementary school. Later (1939) Cooke and King reported a study of Grades 5 and 6 in Cookesville, Tennessee, between homework and supervised study groups. Once again no test data is presented but the authors conclude that home study has no value since both groups made gains.[11]

Steiner (1934) found clear gains by the seventh grade homework group in arithmetic in Ingram, Pennsylvania.[12]

In 1939 Foran and Weber compared computation and problem solving scores for homework and non-homework classes in Grade 7. Although the computation scores showed no difference, there were significant gains for the homework group in problem solving.[13]

Anderson (1946) found homework in an eighth grade Oklahoma school showed higher arithmetic achievement. In 1957 Hines found homework favored higher achievement in plane geometry.[14]

After reviewing these studies, Goldstein concludes that the data in most of the studies favors higher achievement for homework groups, contrary to the statements made by some of the researchers that homework contributes little or nothing to academic achievement. Since none of the above studies dealt with Grades 1 through 4, he made no statements about the value of homework in those grades; however, all seven investigations in fifth and sixth grade show positive effects of homework on math achievement. Consequently, Goldstein feels constructive homework should be a valued and required education procedure in all of the elementary years, graduated from short five-minute daily assignments in first grade to two or three hours in high school.[15]

Austin Studies 1977

Austin reviewed published research in homework in mathematics with special emphasis on studies from 1960-1977. During this time attitude as well as achievement measures were used.

Maertens (1969) compared three groups of 342 third graders: no homework, teacher-prepared homework, and researcher-prepared homework. After one year, experimenter-prepared tests showed no difference between groups. In 1972 Maertens and Johnson separated 400 fourth, fifth, and sixth graders into three treatment groups: no homework, homework with immediate parent feedback, and homework with delayed parent feedback. Both homework groups scored significantly higher except for fifth grade problem solving, which was higher but not significant.[16]

Gray and Allison (1971) used 64 sixth graders to compare drill homework with parental involvement with no homework. After eight weeks there were no differences found.[17]

In 1965 Kock used 82 sixth graders for a study comparing no homework, 15 minutes of homework, and 30 minutes of homework. Iowa Tests were used after ten weeks. The groups did not differ in problem solving skills; however, the 30-minute group did significantly better than the 15-minute group, and the 15-minute group did significantly better than the no homework group.[18]

Austin's post-1950 studies tend to show that homework can significantly improve mathematics achievement with seven comparisons showing significant differences for the homework group and four comparisons showing no difference. Two of his conclusions are that homework seems preferable to no homework in Grades 4 through 10, and the effects of homework may be cumulative.[19]

Coulter Studies 1979

Coulter attempts to stimulate education research in homework by illustrating the problems and nature of the research in some of the studies - and by discussing methodological and conceptual issues.[20]

In addition to citing Goldstein's study showing only 17 original reports of experimental research, Hedges (1971) concluded there was no firm research evidence on various homework facets in his review of 40 studies since 1954. According to Rosenshine (1971) no study of actual classroom behavior related to homework had been done.[21]

Coulter reports similar results to Goldstein's and Austin's from the following studies: Di Napoli, Cooke and Brown, Teahan, Crawford and Carmichael, Kock, Maertens and Johnson. He supports the notion that homework increases achievement; his main concern is with its quality and the conditions under which it is carried out.[22]

Doane (1972) reports that the relationship between mathematics achievement and homework is weak and non-significant for low achievers, but strong for high achievers. This agrees with Ten Brinke's (1967) findings that higher ability students tend to profit more from homework. These two studies represent changes that are taking place in homework research.[23]

Coulter concludes that homework can be an important factor in "time in task."[24]

North Carolina Research Report 1983

Students in North Carolina taking statewide achievement tests in 1982 and 1983 in sixth and ninth grades were asked two questions: the amount of time spent on assigned homework and amount of time spent on work not assigned. Results were compared with scores on the California Achievement Tests. The results showed a positive relationship between doing assigned homework and higher test scores.[25]

Elewar and Corno Study 1985

This study was conducted in Venezuelan elementary schools for ten weeks and aimed to determine the effects of trained teacher homework feedback on student achievement and attitude toward mathematics. The group consisted of 504 sixth-grade students from 18 classes in three public schools selected at random. The same curriculum was used and teachers were trained to give constructive written criticism. The statistics show that although there were no significant differences across groups on pretest scores, the students in experimental groups had higher scores on achievement posttests than those in control groups, regardless of ability level.[26]

No studies were found involving children as young as second grade; however, one study in 1969 on third grade children showed no difference between homework and no-homework groups. Although the results of the studies reviewed were contradictory, many researchers did not seem to favor homework for young elementary students. There seemed to be more evidence, however, showing positive results for those students who were given homework.

CHAPTER THREE

Presentation of the Data

For this study, thirty-nine second grade children at San Jacinto Elementary School were divided into two groups. One class of twenty-three L (on grade level) math students was to be assigned no homework, and one class of sixteen L (on grade level) students was to receive homework. Pretests and posttests were administered to both groups. The unit taught was Unit II, Place Value to 100, in Mathematics Today, Harcourt Brace Jovanovich, Publishers.

Statistical tests were run on a computer at Sam Houston University in Huntsville, Texas. These tests included ESTAT, t tests, and histograms. The data consists of thirty nine observations and six variables with a numerical coding system as follows:

(1)SEX: a numeral 1 is assigned to males and a numeral 2 is assigned to females;

(2)RACE: a numeral 1 is assigned to white and a numeral 2 is assigned to Hispanic;

(3)LATCH KEY: a numeral 1 is assigned to latch-key students, and a numeral 2 is assigned to those who are not latch-key;

(4)PRETEST: raw score based on a total of 25;

(5)POSTTEST: raw score based on a total of 25;

(6)GROUP: a numeral 1 is assigned to the control group that was given no homework and a numeral 2 is assigned to the experimental group that was given homework.

A questionnaire concerning math homework and achievement was also sent to second, third, and fourth grade math teachers in the building.

To provide an overview of the data analyzed, an ESTAT test was run. ESTAT computed the mean, median, maximum and minimum of the six variables. Table 1 shows the results of this test for variables four (Pretest Raw Score) and five (Posttest Raw Score).

Table 1

Presentation of the Means, Medians, Maximums, Minimums

Variable	Means	Median	Maximum	Minimum
Pretest	14.41026	15.00000	20.00000	6.00000
Posttest	21.02564	22.00000	25.00000	14.00000

Table 1 shows an increase in the mean from the pretest to the posttest. The overall range of the pretest is 14, and posttest is 11, showing that the scores on the posttest are more homogeneous -- not as spread out.

Histograms were run for Variables 4 and 5, Pretest and Posttest, as shown in Tables 2 and 3.

Table 2

Histogram Print-out for Pretest

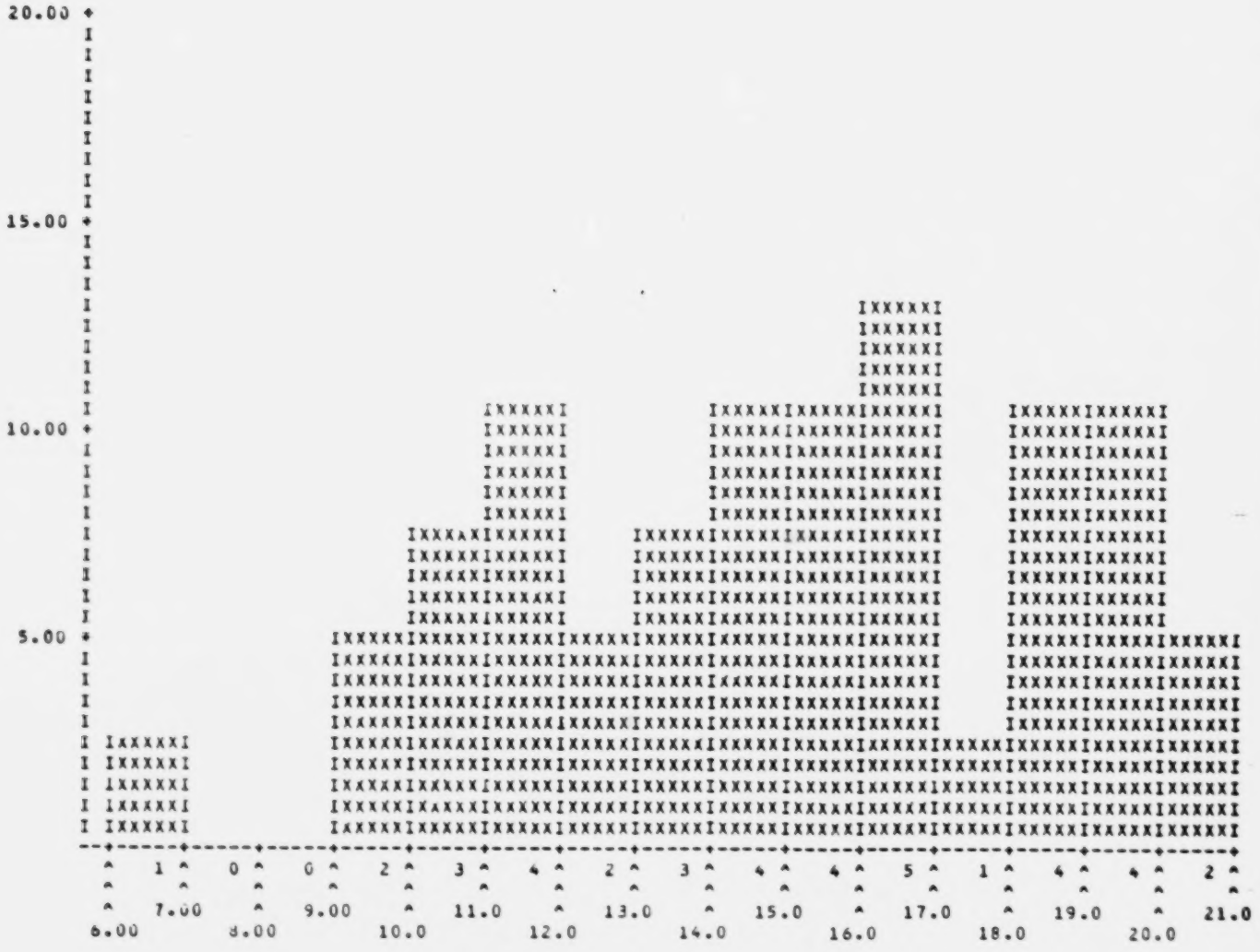
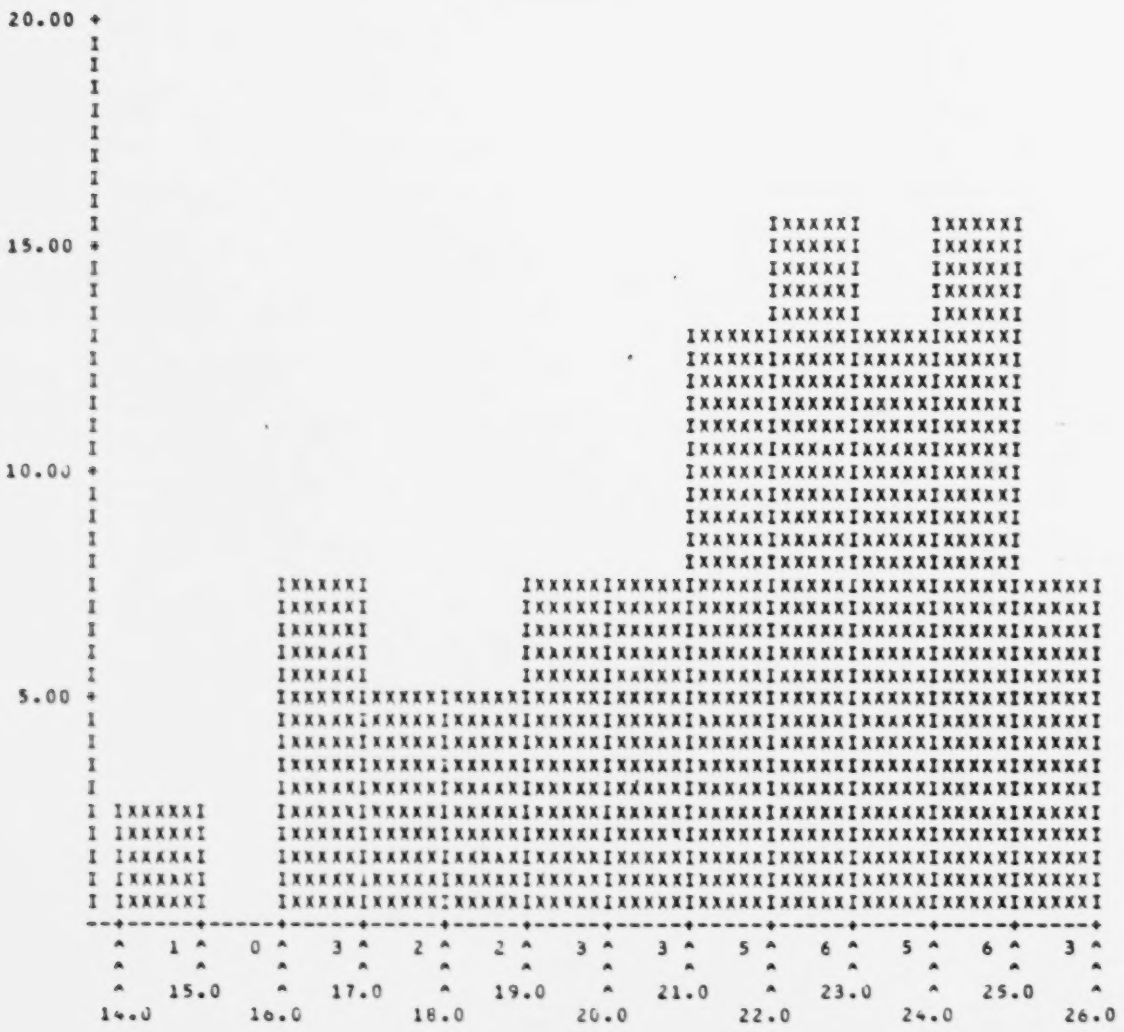


Table 3

Histogram Print-out for Posttest



The histograms also show that the pretest scores are more spread out than the posttest scores and that the posttest scores have increased.

T test scores were run on Variable 5, the pretest, and Variable 6, the posttest, with treatments determined by a

breakdown on Variable 6, non-homework versus homework groups. The results are given in Tables 4 and 5.

Table 4

T Test Print-out Analysis on Pretest
Breakdown on No Homework (Var. 1)
and Homework (Var. 2) Groups

VAR.	SIZE	MEAN	STD. DEV.
1	23	14.57	3.871
2	16	14.19	3.060

1	0.0000E+00 1.00P	
2	-.3255 0.75P	0.0000E+00 1.00P
	1	2

Table 5

T Test Print-out Analysis on Posttest
Breakdown on No Homework (Var. 1)
and Homework (Var. 2) Groups

VAR.	SIZE	MEAN	STD. DEV.
1	23	20.00	2.844
2	16	22.50	2.309

1	0.0000E+00 1.00P	
2	2.908 0.01P	0.0000E+00 1.00P
	1	2

The pretest results in Table 2 show little or no difference between the homework and no homework groups. T test results for the posttest in Table 3, however, show that the group that received homework is significant at the 0.01 level.

T tests were also run on Variable 5, the pretest, and Variable 3, latchkey versus non-latchkey children, with results shown in Table 6.

Table 6

T Test Print-out Analysis on Pretest
Breakdown on Latchkey (Var. 1)
and Non Latchkey (Var. 2)

VAR.	SIZE	MEAN	STD. DEV.
1	17	15.35	3.220
2	22	13.68	3.643

1	0.0000E+00		
	1.00P		
2	-1.493	0.0000E+00	
	0.14P	1.00P	
	1	2	

The level of significance of 0.14P for the latchkey group is high but not significant.

A questionnaire and accompanying cover letter about the effect of math homework on achievement were distributed to the math teachers in Grades 2 through 4 in the building. Nine out of ten (90%) of these questionnaires were returned. Results can be seen in Table 7.

The majority of teachers surveyed were teachers with more than ten years of experience. Most of them felt that homework does increase math achievement.

November 1987

Dear Fellow Teachers:

The enclosed questionnaire is concerned with math homework as it affects achievement.

With the permission of Mr. Kelly Glasco, our principal, two second grade math classes at San Jacinto Elementary have engaged in an experimental unit whereby one group was given math homework and the other group was given no homework. This study was done in conjunction with a research course taken by the writer at Sam Houston State University. It is important to this study for you to complete this questionnaire and return it to the writer's mailbox. Please do not sign your name. Your response will be held in strict confidence.

Circle only one answer per question. Add comments if you wish to state an opinion.

Please return the questionnaire today! A copy of the results is yours for the asking. Thanks for your help.

Elaine Finstad
Second Grade Teacher
San Jacinto Elementary

MATH HOMEWORK AND ACHIEVEMENT

DIRECTIONS: Please answer all items. Add comments if you wish to contribute more information.

1. How many years have you taught? . . . . . 0-10 11-20 over 20

2. What math level do you teach? . . . . . M(below) L(on) K(above)

3. Do you feel that homework increases math achievement? . . . . Yes No

   If yes, in what way? . . . _____

   _____

4. What is your main purpose in assigning homework? . . drill extend class work problem solving

5. How many days per week do you assign homework? . . . . . 0 1 2 3 4 or 5

6. Homework submitted is . . .ungraded spot checked graded

7. Does homework count toward report card grades? . . . . . Yes No

   If yes, explain how . . . _____

   _____

Table 7

Survey of San Jacinto Math Teachers
Homework and Achievement
Grades 2-4

1. How many years have you taught?
   0-10 (22%) 11-20 (67%) over 20 (11%)

2. What math level do you teach?
   M(below) (33%) L(on) (45%) K(above) (22%)

3. Do you feel that homework increases math achievement?
   Yes (89%) No (11%)

   If yes, in what way?
   Responses indicated that practice helps, reinforcement is beneficial, and more than class time is needed.

4. What is your main purpose in assigning homework?
   drill (56%) extend classwork (44%) problem solving (0%)

5. How many days per week do you assign homework?
   0 (0%) 1 (0%) 2 (22%) 3 (56%) 4 or 5 (22%)

6. Homework submitted is:
   ungraded (0%) spot checked (78%) graded (22%)

7. Does homework count toward report card grades?
   Yes (44%) No (56%)

   If yes, explain how:
   Teachers handled this differently, but all used the grade as an incentive for completing homework. Some counted it in with daily grades, some gave all homework one test grade, and some gave it a percentage of the total grade.

CHAPTER FOUR

Summary, Conclusions, and Recommendations

Summary

In this study a comparison was made between children that have homework and children that do not have homework in the second grade to determine whether or not homework affects math achievement.

Conclusions

The findings show that the achievement of the experimental group that was given homework is statistically significant over the control group with no homework at the .01 level. Therefore, the null hypothesis, that homework has no effect on second grade math achievement, is rejected for this population. Second grade teachers at San Jacinto Elementary might want to incorporate meaningful math homework into the curriculum.

Recommendations

Since few studies have been done at the second grade level and the results of this study were statistically significant, the findings merit further attention. Since the sample size was small and the time frame was short, the researcher recommends that this study be replicated with larger and varied populations over longer time periods to determine the effect of homework on second grade math achievement. Also replicate the study with other grade levels.

NOTES

[1]Texas Education Code, House Bill 72, the Education Reform Act of 1984, Chapter 75.

[2]James Braswell, "One Point of View: Improving Performance," Arithmetic Teacher, May 1985: 1.

[3]"Information and Guidelines for Developing a Homework Policy," Caddo Parish Schools, Shreveport, Louisiana, 1981: i - ii.

[4]"The First Step to Change the Public Schools," Ladies' Home Journal, Jan. 1913: 3-4.

[5] Ronald T. La Conte, "Homework as a Learning Experience," National Education Association, 1981: 25.

[6]J.D. Austin, "Homework Research in Mathematics," School Science and Math, 1978: 115.

[7]Avram Goldstein, "Does Homework Help? A Review of Research," Elementary School Journal, 1960: 221.

[8]Goldstein, pp. 213-215.

[9]Goldstein, pp. 215-216.

[10]Goldstein, pp. 216-217.

[11]Goldstein, p. 217.

[12]Goldstein, pp. 217-218.

[13]Goldstein, p. 219.

[14]Goldstein, pp. 219, 221.

[15]Goldstein, pp. 221-222.

[16]Austin, p. 117.

[17]Austin, p. 117.

[18]Austin, p. 118.

[19]Austin, p. 119.

[20]Frank Coulter, "Homework: A Neglected Research Area," British Educational Research Journal, vol. 5, no. 1, 1979: 21.

[21]Coulter, p. 21.

[22]Coulter, pp. 22-23.

[23]Coulter, p. 25.

[24]Coulter, p. 32.

[25]"Report on Student Homework and Achievement," Spring 1982 and Spring 1983, Special Research Studies, 1983-84, North Carolina State Department of Public Instruction, Raleigh, Div. of Research, Sept. 1983: 1.

[26]Maria Cardelle Elawar and Lyn Corno, "A Factorial Experiment in Teachers' Written Feedback of Student Homework: Changing Teacher Behavior a Little Rather Than a Lot," Journal of Educational Psychology, 1985: 162-173.

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